04-ESQ-0224

U.S. Department of Energy
Office of River Protection
Mr. R. J. Schepens
Manager
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CCN: 094063

SEP 27 2004

Dear Mr. Schepens:

CONTRACT NO. DE-AC27-01RV14136 – CLOSURE INFORMATION FOR CONDITION OF ACCEPTANCE FOR THE HANFORD TANK WASTE TREATMENT AND IMMOBILIZATION PLANT PRELIMINARY SAFETY EVALUATION REPORT

References: 1) ORP/WTP-2004-02, Revision 0, *Safety Evaluation Report for Waste Treatment and Immobilization Plant (WTP) Analytical Laboratory Construction Authorization.*

2) CCN 054956, Letter, from R. J. Schepens, ORP, to J. P. Henschel, BNI, "Risk Goal Assessment Improvements," 03-AMWTP-025, dated March 26, 2003.

This letter provides closure information for two Conditions of Acceptance (COA) contained in Reference 1, Appendix B, Section 4.1. The COAs read as follows:

"Revise the analytical laboratory ORA as follows (see Section 4.3.2):

(a) Develop a written process within 60 days of the laboratory PSAR approval to periodically assess the performance of barriers, engineered safety features and administrative controls as discussed in ORP letter 03-AMWTP-025.

(c) Provide a schedule for requantification that commits to requantify the lab risk as the first phase of the overall requantification effort. The schedule will be provided to ORP within 60 days of ORP approval of the laboratory PSAR."

The attached guide provides a written methodology for assessing the performance of barriers, engineered safety features, and administrative controls as discussed in Reference 2. This methodology assesses proposed design changes using a series of screening criteria and more formal evaluations. These assessments provide assurance that implementation of the proposed changes will not compromise satisfying U.S. Department of Energy's (DOE) two quantitative risk goals in the Final Safety Analysis Report (FSAR).

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DOE-ORP/ORPCC

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The attachment formalizes the expectations of Bechtel National, Inc. (BNI) management for considering the impacts of design changes on the Operational Risk Assessment (ORA). This process has been implemented to evaluate changes since the ORA quantification. BNI believes that the risk posed by the Hanford Tank Waste Treatment and Immobilization Plant design currently authorized by DOE is within the risk goals. Continued application of the methodology in the attachment provides assurance that the final design will also satisfy the risk goals. On this basis, BNI believes that a full requantification of the ORA prior to December 2005 is not necessary. BNI proposes to requantify the ORA in support of the FSAR submittal. An ORA requantification schedule will be presented to DOE once the FSAR schedule is finalized. Requantification of the Laboratory risk will be the first phase of the overall requantification.

BNI requests closure of these COAs.

If you have any questions please contact Mr. Bill Spezialetti at 371-3074 or Andy Larson at 371-3693

Very truly yours,

J. P. Henschel
Project Director

TR/slr

Attachment: Guide 24590-WTP-GPG-016, Revision 0, *ORA Impact Evaluation*

Approved By:

Prepared By: Andy Larson

Fred Beranek, E&NS Manager 9/23/04 Date

Guide:

ORA Impact Evaluation

Contents

1.0 Objective

Procedure 24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance*, requires that design changes be evaluated to determine that they are both safe and consistent with the safety envelope. The procedure also requires that impacts on the Operational Risk Assessment (ORA) should be considered in determining safety adequacy. The objective of this guide is to provide a process for evaluating the impacts of changes in design, operating protocols or consequences to provide assurance that they do not negatively impact the ORA such that the risk goals could be exceeded. This process is largely qualitative and relies on a series of screening criteria to identify changes requiring a more formal assessment. This guide applies to all component safety classifications (Additional Protection Class, Commercial Material, Risk Reduction Class, Safety Class, Safety Design Class, Safety Significant, and Safety Design Significant).

The ORA is an assessment to evaluate the Hanford Tank Waste Treatment and Immobilization Plant (WTP) design against the facility risk goals. The facility level risk goals to which the calculated WTP risks will be compared are defined in 24590-WTP-SRD-ESH-01-001-02, *Safety Requirements Document (SRD)* Volume II, as shown below:

- **Safety Criterion 1.0-2.** *The risk to an average individual in the vicinity of the Contractor's facility, of prompt fatalities that might result from an accident shall not exceed one-tenth of one percent (0.1%) of the sum of prompt fatality risk resulting from other accidents to which members of the U.S. population generally are exposed. (For evaluation purposes, individuals are assumed to be located within 1 mile of the controlled area.)*
- **Safety Criterion 1.0-3.** *The risk, to the population (public and workers) in the area of the Contractor's facility, of cancer fatalities that might result from facility operation shall not exceed one-tenth of one percent (0.1%) of the sum of cancer fatality risks to which members of the U.S. population generally are exposed. (For evaluation purposes, individuals are assumed to be located within 10 miles of the controlled area.)*

2.0 Scope

This guide is intended to support the evaluation of all changes on the ORA. This is done by defining screening criteria to identify changes with potential ORA impacts. These criteria distinguish changes with no risk implications from those that could possibly affect the ORA. Additional screening criteria are provided to assess impacts on events identified as risk dominant events and impacts on events that are not risk dominant. These criteria screen changes with minor ORA impacts, changes that are unlikely to impact the conclusions of the ORA, from changes that require additional consideration because of their potential impact.

Generally, this guide will be used by Facility Nuclear Safety (FNS) Supervisors during the Engineering Document Review (EDR) development phase of primary documents for each of the WTP facilities. These evaluations are "judgment" based (qualitative). This guide applies to Important to Safety (ITS) and non-ITS changes.

ITS changes that could result in a negative impact to the ORA risk goals include the following:

- Changes to a credited control strategy element (CSE) or to a safety case requirement (SCR)
- Changes in Severity Levels

- Changes in initiating event frequency
- Changes in Control Philosophy
- Throughput changes
- Cycle time changes
- Maintenance interval changes

ITS changes require a written safety evaluation under 24590-WTP-GPP-SREG-002. The ORA considers both ITS and non-ITS structures, systems, and components (SSCs); so it is crucial to the success of the risk goal that evaluations not be limited to ITS components. Non-ITS SSCs, which are modeled in the ORA, are generally SSCs which have previously been credited as CSEs; but, are not identified as SCRs in the Standards Identification Process Database (SIPD) (refer to 24590-WTP-GPP-SANA-003). Non-ITS changes would receive a written safety evaluation per 24590-WTP-GPP-SREG-002 if they could affect ITS SSCs. Non-ITS changes that are screened from further evaluation under 24590-WTP-GPP-SREG-002 would be unlikely to affect the ORA. However, non-ITS CSEs are likely credited in the ORA and any change to a non-ITS CSE or CSE support system should be evaluated according to the criteria of this guide.

Changes that fail the screening criteria established by this guide require further consideration. They should be brought to the attention of the Environmental and Nuclear Safety (E&NS) Risk and Reliability Lead for further evaluation. The Risk and Reliability Lead will determine if the change can be implemented as is or if it must be modified so that its impact on the ORA is acceptable.

The methodology in this guide does not demonstrate conformance with the Risk Goals by accounting for cumulative risk changes. Rather, it is designed to evaluate individual design changes against screening criteria to provide a high degree of confidence that the design continues to meet the risk goals. Final confirmation of conformance with the Risk Goals will be provided by the ORA for the Final Safety Analysis Report.

3.0 Guidance

The sections to follow present the evaluation guidance required to confirm ORA Risk Goal compliance. EDR changes that have no impact on the plant design and are clearly editorial do not require a Safety Evaluation (SE) per 24590-WTP-GPP-SREG-002 nor do they require further ORA screening. The following is an example:

> *Engineering eliminates control circuitry from P&ID drawings. These changes do not constitute elimination of control circuitry because it has been determined to not show control circuitry on P&IDs.*

If an SE is required per 24590-WTP-GPP-SREG-002, the FNS Supervisor should ensure that the response to "Does the change fail to provide adequate safety?" clearly provides the basis for the decision. Examples are:

- These changes do not trip the screening criteria identified in this guide, ***or***
- The ORA evaluation performed by the ORA lead, and identified by correspondence control number, demonstrates that the contribution to the risk goal is acceptable.

Appendix A shows a flowchart of the ORA impact evaluation process to be followed in addressing this question. The following sections provide additional guidance for qualitative evaluations of design change ORA impacts.

3.1 Qualitative Evaluation for All Changes

A proposed change **need not be** subject to further ORA review **provided the change does NOT result in**:

1. A new hazard (CSD), a new control (CSE) or an accident sequence (CSD) that was not previously modeled in the ORA.
2. Complete removal of a control (ITS or Non-ITS) that was previously credited in the ORA unless the corresponding hazard has also been removed, e.g., by a change in the process.
3. Any reduction in the reliability (including replacement of automatic controls with manual controls and/or inclusion of significant human-machine interface) of any facility support systems including manual interfaces (ITS and Non-ITS). Changes in support system reliability are important because changes of this type will affect multiple accident sequences and will result in a cumulative (common cause) effect that is near-impossible to predict without detailed knowledge of the ORA structure. Typical support systems (generally CSEs and SCRs) include:

    - Off-Site Power
    - On-site Power (AC and DC)
    - Plant Air
    - ITS Air
    - Ventilation (C5, Off-Gas, C3)
    - Hydrogen Control
    - Administrative procedures, controls and operating protocols

    It is important to note that non-ITS changes may have an impact on credited controls (generally CSEs) modeled in the ORA. As an example, solid-state controls are very sensitive to static electricity in low relative humidity conditions. Therefore, elimination of the HVAC humidifiers (non-ITS equipment) could change the operating environment in a way that adversely affects the reliability of ITS controls. These types of changes should be brought to the attention of the ORA lead.

4. An **adverse** effect **on more than one** of the parameters which define the risk contribution from any accident sequence, i.e., if the change:

    - Increases **BOTH** the initiating event frequency **AND** the unreliability of an associated control (ITS and Non-ITS) credited in the ORA
    - Increases **EITHER** the initiating event frequency **OR** the unreliability of an associated controls (ITS and Non-ITS) credited in the ORA **AND** the associated accident severity level dose estimate

If the change requires further review, determine if it affects a dominant accident sequence or non-dominant accident sequence and follow the guidance in section 3.2 or 3.3, respectively. If unable to determine an affected accident sequence, contact the Risk and Reliability lead for help.

3.2 Qualitative Evaluation for Changes Affecting Dominant Accident Sequences

A proposed change **need not be** subject to review by the Risk and Reliability Group **provided the change does not result in** any of the following impacts on a **DOMINANT ACCIDENT SEQUENCE** (See the Risk and Reliability Lead to determine whether or not a sequence is a dominant contributor to the ORA).

The change does not cause, nor is it accompanied by changes, which have the following effects on any **dominant** accident sequence:

1. Initiating Event (IE) frequency is not expected to increase by a factor of more than threefold (X3):

   Typical IE frequencies are defined in terms of:

   - annual rate for loss of hazard confinement (spill, leaks)
   - annual number of potential operational challenges to a safety system from normal operating processes (transfers, batches, operational cycles)
2. Failure probability for an ITS control (CSE or SCR) does not increase by more than one order of magnitude (X10).
3. All Non-ITS controls credited in the ORA remain as part of the baseline design, and have not experienced an increase in failure probability, which is greater than one order of magnitude (X10).
4. Severity Level dose estimates for the potential release do not increase more than threefold (actual dose estimate X3).

If the proposed change does not satisfy these criteria, consult the Risk and Reliability Lead to obtain an assessment of the change.

3.3 Qualitative Evaluation for Changes Affecting Non-Dominant Accident Sequences

A proposed change **need not be** subject to quantitative review by the Risk and Reliability Group **provided the change does not result in** any of the following impacts on a **NON-DOMINANT ACCIDENT SEQUENCE** (See the Risk and Reliability Lead to determine whether or not a sequence is a dominant contributor to the ORA).

The change does not cause, nor is it accompanied by changes, which have the following effects on any **non-dominant** accident sequence:

1. Initiating Event (IE) frequency is not expected to increase by a factor of more than one order of magnitude (X10). Note that the allowed increase in IE frequency and dose are more restrictive because of their potential to be implicated in many accident sequences whose cumulative effects on risk may be less easily discerned.

   Typical IE frequencies are defined in terms of:

   - annual rate for loss of hazard confinement (spill, leaks)
   - annual number of potential operational challenges to a safety system from normal operating processes (transfers, batches, operational cycles)

2. Failure probability for an ITS control (CSE or SCR) does not increase by more than two orders of magnitude (X100).
3. All Non-ITS controls credited in the ORA remain as part of the baseline design, and have not experienced an increase in failure probability which is greater than two orders of magnitude (X100).
4. Severity Level dose estimates for the potential release do not increase more than one order of magnitude (actual dose estimate X10).

If the proposed change does not satisfy these criteria, consult the Risk and Reliability Lead to obtain an assessment of the change.

4.0 Records

Documentation generated by this document shall be submitted to PDC for logging, issuance, distribution, and records retention to meet project records management requirements. There are no records generated by this guide.

4.1 Revision History

Revision	Reason for Revision
0	New guide to explain implementation of the ORA evaluation process.

5.0 References

24590-WTP-GPP-SANA-003, *Standards Identification Process Database*

24590-WTP-GPP-SREG-002, *Authorization Basis Maintenance*

24590-WTP-SRD-ESH-01-001-02, *Safety Requirements Document* Vol. II

DOE/RL-96-0006. *Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for the RPP Waste Treatment Plant Contractor*

RL/REG-00-08. *Regulatory Unit Position on Conformance with Risk Goals in DOE/RL-96-0006*

6.0 Appendices

Appendix A: ORA Impact Evaluation Flow Process